Homework 6: Differentiation & Filtering

Due: Wednesday, May 1st by 4:00 PM (hard-copy & drop-box formats)

A **vibrating cantilever beam** time signature (*beam_vib_data.dat* on *myCourses*), proportional to displacement of the beam free-end, is to be differentiated in order to determine beam flexure velocity and acceleration.

- Use central differencing techniques to compute the first and second derivatives of the raw (unfiltered) vibrating beam data signature.
- Create a *moving average filter* (FIR) to "adequately" filter the data signature, then re-compute the derivatives.
- Create a *recursive filter* (IIR) of 1^{st} or 2^{nd} recursive order to "adequately" filter the data signature, then re-compute the derivatives.
- Generate appropriate plots showing the respective data signature and its derivatives for the Unfiltered, FIR filtered, and IIR filtered cases. Zoom in/out as appropriate to display relevant information.
- Define/document the IIR and FIR filters employed along with your design rationale.

Submit **no more than three pages.**